A Model for Live Mission Data Systems using the OAIS Reference Model
Data Distribution Laboratory

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Space sciences are confronted with overwhelming volume of data. The data rates are increasing, the granularity of registered observations is continuously refining, and computer technology allows producing terabytes of images and catalogs. The inexpensive emerging storage technologies, combined with the availability of high-speed communications will offer the infrastructure for extremely large data repositories to be accessible on-line. Mission data will be quickly accessible almost immediately after it has been collected from space observations. On-line science will demand for new tools and technologies for data access, data analysis, and data discovery. These trends will enhance the archival operational concepts mainly related to the long-term information preservation, placing an equally important emphasis on rapid data production, and dissemination to consumers.

However, archive storage technologies have lagged almost 5 years compared to real-time storage systems due to issues with media longevity and cost efficiency. Thus, there tend to be separate systems for an on-line processing operation and an archival operation. We do not see dramatic changes in this trend due to the nature of archive requirements in near future. If there could be a combined system, which satisfies requirements from an operational system and archival system, it would be an ideal system that is cost effective and efficient. In this paper, we are proposing to build an efficient storage system to offer both state-of-the-art storage technology and longevity. We propose to develop a storage system, which combines reliable hardware technology with rigorous system operations concepts. We believe that the proposed system will satisfy both real-time processing system and archive system needs. We will discuss architecture, policies and processes, future trends, and operational concepts for both hardware and software environment.

The assumption of OAIS (Open Archive Information System) is that information need a long-term preservation. Long term is to be concerned with impact of changing technologies, including support for new media and data formats, or with a changing user community. The near term preservation is concerned with more stringent access modes, a known and potentially narrower designated community and possibly with real time or online requirements.

We advocate architecture at the confluence of these requirements. This model will apply to any space mission data system. The current mission data systems are characteristically built for the duration of the mission, with the main purposes of satisfying the mission needs. We are studying the effects of a longer-term perspective on using and preserving the data, and we determine what is the desirable architecture for achieving both goals.